TRUMPETER SWAN SURVEYS ON THE CHUGACH NATIONAL FOREST 2004

Deborah J. Groves
John I. Hodges
U.S. Fish and Wildlife Service
3000 Vintage Blvd., Suite 240
Juneau, Alaska 99801

Edward J. Mallek
U.S. Fish and Wildlife Service
1412 Airport Way
Fairbanks, Alaska 99701

Daniel Logan
U.S. Forest Service
P.O. Box 280
Cordova, Alaska 99574

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ABSTRACT

Trumpeter swan (*Cygnus buccinator*) aerial surveys were conducted during May and August 2004 on the Copper River Delta and surrounding areas of the Chugach National Forest in southcentral Alaska. The surveys were accomplished through cooperation between the U.S. Fish and Wildlife Service and the U.S. Forest Service. In May 940 white (adult and subadult) swans and 161 nests were counted. In August 970 white swans and 189 cygnets in 59 broods were recorded. Production was average. Nest success was 0.37, mean brood size was 3.2, and young made up 16% of the early fall population. The total fall swan population decreased 2% from 2003 and was 33% above the mean. There are now 55 comparable swan surveys in 29 different years for this area. A continued standardized trumpeter swan survey program is recommended.

INTRODUCTION

The Copper River Delta and surrounding coastal wetlands in the Chugach National Forest support a large and dense nesting and summering population of trumpeter swans (*Cygnus buccinator*). Aerial surveys were conducted in this area as part of U.S. Fish and Wildlife Service (USFWS) statewide trumpeter censuses in 1968, 1975, 1980, 1985, 1990, 1995, and 2000 (Hansen et al. 1971, King 1976, King and Conant 1981, Conant et al. 1985, Conant et al. 1991, Conant et al. 1996, Conant et al. 2001). The U.S. Forest Service (USFS) initiated aerial surveys in 1978, and annual swan surveys have been jointly accomplished under a formal agreement between the USFWS and USFS since 1981.

SURVEY AREA

The survey area was comprised of portions of the Copper River Delta and Controller Bay drainages within 11 U.S. Geological Survey 1:63,360 scale topographic maps (Figure 1). The area actually surveyed consisted of all potential swan nesting and summering habitat delineated on these maps (1787 km^2). In general, potential swan habitat included most lakes, rivers, streams and all wetland areas under 760 m (2500 ft) elevation.

METHODS

Aerial surveys were conducted 26-28 May 2004 with a Cessna 206 and on 23-25 August 2004 with the USFWS Turbo-Beaver (N754). The aerial survey method used for both surveys was described by King (1973). Generally, a system of parallel tracks was flown over all known and suspected habitat within each 1:63,360 quadrangle map at an altitude of 150-180 m above ground. The pilot was responsible for navigation, making swan observations, and ensuring that all swan habitat was adequately surveyed, considering factors such as visibility and observer experience. The primary observer was responsible for making swan observations, recording the type and exact location of each observation onto computerized or paper 1:63,360 maps, and tracking the flight path if using paper maps (the flight path was recorded automatically for crews using an onboard computer). During five previous USFS surveys in which chartered aircraft

were used, all duties were assumed by the observers. Back seat observers were used, when available, to increase the eye power from the aircraft.

Swan attribute data from completed paper maps were entered into a personal computer. The latitude and longitude of each observation were determined from the original survey maps using an Altek digitizing system. The geographic coordinates were then merged with the attribute data to form the final data files. When the onboard computer system was used to record data, digitizing was not necessary because the file output already included both the attribute data and the geographic coordinates for each observation. The software used for this onboard system was developed by John I. Hodges, USFWS, Migratory Bird Management, Juneau, Alaska.

RESULTS

Population Trend

In May 2004, 940 white swans (adults and sub-adults) were counted, up 3% from spring 2003 and 44% above the mean (Table 1). The number of single/paired birds decreased from last year but was still the second-highest count on record for the survey (Table 1).

In August 2004, 970 white swans were counted, up 5% from August 2003 and 42% above the mean (Table 2, Figures 1 and 2). This represents a new high count for the survey area. The number of single/paired birds decreased from 2003, while flocked birds increased dramatically (Table 2). The total number of swans, including cygnets, was 1159 in 2004, down 2% from 2003 and 33% above the mean (Table 2, Figure 2).

Productivity

Forty seven percent of pairs had a nest in May, 10% below the mean (Table 3). The below-average value reflects the large number of pairs that were present, because the actual number of nests (161) reached a new record high, surpassing last year's record by 12%. A total of 189 cygnets in 59 broods were observed in August, equal to and 5% above the mean, respectively (Table 3, Figure 3). Nest success, defined as the proportion of occupied nests in May that produced at least one cygnet still alive in August, was 26% below the mean at 0.37 (Table 3). The number of young per occupied nest, a productivity statistic based on the number of known territorial pairs (as evidenced by the presence of a nest or brood), was 1.2, mean brood size was 3.2, and young made up 16% of the early fall population (Tables 2 and 3).

DISCUSSION

The size of the fall swan population in the survey area has fluctuated between about 500 and 1200 birds since surveys began in 1968. The population increased in the early survey years until it peaked at 1118 birds in 1984, then decreased to 662 in 1991. Since that time, the population has fluctuated somewhat from year to year but overall has increased back to its previous high

level seen in the mid-1980's. In 2001 it reached a new high of 1222 birds and has remained above 1000 since.

Nesting effort as measured by the number of nests was very good this year, but parameters measuring reproductive success were mainly average to below average. Overall, trumpeter swans experienced average production on the Copper River Delta and Controller Bay drainages in 2004.

BIAS

Possible sources of bias in these data come from using different pilots and observers with variable levels of experience and training, using more than one type of aircraft, and surveying in variable weather conditions. However, by using a standardized system, comparable sets of data were collected as evidenced by comparable recorded flight paths and mileages flown.

RECOMMENDATIONS

We now have 55 comparable trumpeter swan surveys (26 spring and 29 fall) on the Copper River Delta, one of the most complete records for any swan population in Alaska. We recommend continuing a cooperative program of two surveys per year. Information acquired from both the early and late phases of the breeding season has greatly enhanced our ability to understand the factors influencing the population's reproductive success. Long term, standardized data sets such as these are an invaluable tool for evaluating population dynamics and properly managing trumpeter swan breeding populations.

SURVEY PERSONNEL

Swan surveys summarized in this report were conducted by the following individuals and agencies:

Year	Spring Survey Personnel	Fall Survey Personnel
1968		J. King, J. Bartonek - USFWS
1975		J. King, T. Schoenfelder - USFWS
1978	G. Bucaria, S. Watson – USFS	G. Bucaria, S. Watson – USFS
1979		C. Moitoret – USFS
1980	G. Bucaria, D. Logan – USFS	J. King, B. Conant – USFWS
1981	G. Bucaria – USFS	J. King, B. Conant – USFWS
1982	R. King, G. Bucaria – USFWS, USFS	J. King, B. Conant – USFWS
1983	R. King, Zimmerman – USFWS	B. Conant, D. Derksen, J. Baker, M. Jacobson, G. Covel, Broekema – USFWS, USFS
1984	R. King, R. Leedy – USFWS	B. Conant, J. Hodges – USFWS
1985	R. King, T. Simon-Jackson – USFWS	B. Conant, S. Cain – USFWS
1986	R. King, K. Bollinger – USFWS	B. Conant, J. Hodges – USFWS
1987	R. King, M. North – USFWS	B. Conant, J. Hodges – USFWS
1988	R. King, R. Pospahala – USFWS	B. Conant, J. Hodges – USFWS
1989	R. King, F. Gerhardt – USFWS	B. Conant, R. Oates, M. Jacobson – USFWS
1990	R. King, A. Brackney – USFWS	B. Conant, D. Groves, J. King – USFWS
1991	R. King, A. Brackney – USFWS	B. Conant, D. Groves – USFWS
1992	R. King, D. Youkey – USFWS, USFS	J. Hodges, J. King – USFWS
1993	R. King, D. Youkey – USFWS, USFS	J. Hodges, D. Groves, D. Youkey – USFWS, USFS
1994	R. King, P. Greene – USFWS, USFS	B. Conant, D. Groves – USFWS
1995	R. King, R. Leedy – USFWS	B. Conant, E. Lucas – USFWS
1996	R. King, S. Hill – USFWS	J. Hodges, D. Groves – USFWS
1997	R. King, T. Tiplady – USFWS	B. Conant, G. Fowler – USFWS, Ducks Unlimited Canada
1998	W. Larned, J. King – USFWS	B. Conant, J. King – USFWS
1999	W. Larned, T. Tiplady – USFWS	B. Conant, J. King – USFWS
2000	J. Sarvis, R. Oates – USFWS	B. Conant, D. Petersen – USFWS
2001	E. Mallek, P. Anderson – USFWS	B. Conant, J. King – USFWS
2002	E. Mallek, L. Lysne – USFWS	B. Conant, L. Lysne, D. Groves – USFWS
2003	E. Mallek, L. Lysne - USFWS	B. Conant, H. Wilson – USFWS
2004	E. Mallek, J. King – USFWS	J. Hodges, H. Wilson - USFWS

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_____, _____, _____,and _____. 1996. Alaska trumpeter swan status report - 1995. U.S. Fish and Wildlife Service Report, Juneau, Alaska.

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King, J. G. 1973. The use of small airplanes to gather swan data in Alaska. Wildfowl 24:15-20.

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Table 1. Spring survey swan observations - Chugach National Forest (1978-2004).

Year	Dates Flown	Observations	White Swans				Cygnets	Total Swans
			Paired	Single	Flocked	Subtotal		
1978	5/15-5/18	192	278	20	362	660	--	660
1980	May[a]	222	320	45	169	534	--	534
1981	5/21-5/23	244	350	37	235	622	--	622
1982	6/2-6/4	247	356	44	200	600	--	600
1983	6/6-6/8	297	448	47	144	639	23	662
1984	5/21-5/23	324	502	43	190	735	--	735
1985	6/8-6/10	309	452	50	235	737	--	737
1986	5/22-5/24	304	508	35	123	666	--	666
1987	5/22-5/26	291	462	39	101	602	--	602
1988	5/25-5/26	263	418	42	116	576	5	581
1989	5/17-5/19	241	400	28	174	602	--	602
1990	5/23-5/25	226	374	25	121	520	--	520
1991	5/20-5/22	250	394	34	152	580	--	580
1992	5/19-5/20	249	412	25	195	632	--	632
1993	5/15-5/17	248	394	25	159	578	--	578
1994	5/24-5/25	278	436	31	204	671	--	671
1995	5/25-5/26	246	402	24	157	583	--	583
1996	5/21-5/22	267	442	27	125	594	--	594
1997	5/26-5/27	246	406	27	84	517	--	517
1998	5/26-5/29	285	462	40	110	612	--	612
1999	6/3-6/5	229	358	33	79	470	--	470
2000	5/25-5/26	256	408	28	255	691	--	691
2001	5/29-5/31	261	410	39	117	566	31	597
2002	5/29-5/31	400	536	88	391	1015	--	1015
2003	5/27-5/29	417	632	76	205	913	--	913
2004	5/26-5/28	389	606	52	282	940	--	940
Mean		276	429	39	180	648	--	651

[a] Exact dates unknown.

Table 2. Fall survey swan observations - Chugach National Forest (1968-2004).

Year	Dates Flown	Observations	White Swans				Cygnets	Young in Pop.(%)	Total Swans
			Paired	Single	Flocked	Subtotal			
1968	8/14-8/16	199	326	24	181	531	267	33	798
1975	8/14-8/20	196	312	24	142	478	131	22	609
1978	8/9-8/12	186	248	36	127	411	103	20	514
1979	8/18-8/23	160	234	20	217	471	143	23	614
1980	8/5-8/12	262	410	33	187	630	216	26	846
1981	8/4-8/22	234	374	16	287	677	266	28	943
1982	8/11-8/14	271	436	27	227	690	152	18	842
1983	8/4-8/15	314	512	32	219	763	259	25	1022
1984	8/6-8/10	303	448	42	400	890	228	20	1118
1985	8/11-8/16	348	534	45	319	898	111	11	1009
1986	8/6-8/8	298	490	25	200	715	188	22	903
1987	8/1-8/3	318	510	46	175	731	64	8	795
1988	8/3-8/5	281	472	29	145	646	217	25	863
1989	8/3-8/6	278	460	41	98	599	117	16	716
1990	8/5-8/12	267	424	35	169	628	245	28	873
1991	8/2-8/4	253	400	36	90	526	136	21	662
1992	8/29-9/1	197	314	19	231	564	250	31	814
1993	8/22-8/24	237	368	29	218	615	201	25	816
1994	8/24-8/28	260	382	24	404	810	131	14	941
1995	8/2-8/6	280	408	51	185	644	97	13	741
1996	8/25-8/28	259	430	23	176	629	151	19	780
1997	8/14-8/17	259	416	25	157	598	175	23	773
1998	8/2-8/4	273	428	37	185	650	217	25	867
1999	8/10-8/14	258	408	27	199	634	182	22	816
2000	8/2-8/7	325	512	41	202	755	209	22	964
2001	8/22-8/24	314	520	26	324	870	352	29	1222
2002	8/4-8/6	313	472	50	376	898	228	20	1126
2003	8/6-8/8	349	518	50	360	928	259	22	1187
2004	8/23-8/25	284	446	27	497	970	189	16	1159
Mean		268	421	32	231	684	189	22	874

Table 3. Swan productivity - Chugach National Forest (1968-2004).

Year	% Pairs with Nest in Spring	% Pairs with Brood in Fall	Nests	Broods	Nest Success[a]	Mean Brood Size	Young Per Occupied Nest[b]
1968	--[c]	40	--[c]	67	--[c]	4.0	--[c]
1975	--[c]	24	--[c]	39	--[c]	3.4	--[c]
1978	51	26	78	32	0.41	3.2	1.3
1979	--[c]	34	--[c]	41	--[c]	3.5	--[c]
1980	59	30	94	62	0.66	3.5	2.3
1981	58	34	120	67	0.56	4.0	2.2
1982	40	23	83	51	0.61	3.0	1.8
1983	27	27	68	71	1.04	3.6	3.8
1984	53	27	143	61	0.43	3.7	1.6
1985	42	13	103	37	0.36	3.0	1.1
1986	52	24	140	60	0.43	3.1	1.3
1987	43	10	115	25	0.22	2.6	0.6
1988	59	29	133	68	0.51	3.2	1.6
1989	63	17	130	38	0.29	3.1	0.9
1990	67	33	130	70	0.54	3.5	1.9
1991	64	25	129	49	0.38	2.8	1.1
1992	65	46	134	73	0.54	3.4	1.9
1993	59	32	118	61	0.52	3.3	1.7
1994	57	23	130	44	0.34	3.0	1.0
1995	56	17	115	35	0.30	2.8	0.8
1996	48	19	106	40	0.38	3.8	1.4
1997	55	25	117	54	0.46	3.2	1.5
1998	57	30	137	66	0.48	3.3	1.6
1999	54	26	105	55	0.52	3.3	1.7
2000	52	25	115	66	0.57	3.2	1.8
2001	39	35	90	93	1.03	3.8	3.9
2002	43	29	129	69	0.53	3.3	1.8
2003	41	26	144	70	0.49	3.7	1.8
2004	47	26	161	59	0.37	3.2	1.2
Mean	52	27	118	56	0.50	3.3	1.7

[a] Proportion of total nests that produced 1 or more young to near fledging age.

[b] Total number of young in fall divided by total number of nests and broods (known territorial pairs) in spring.

[c] Spring survey not conducted.

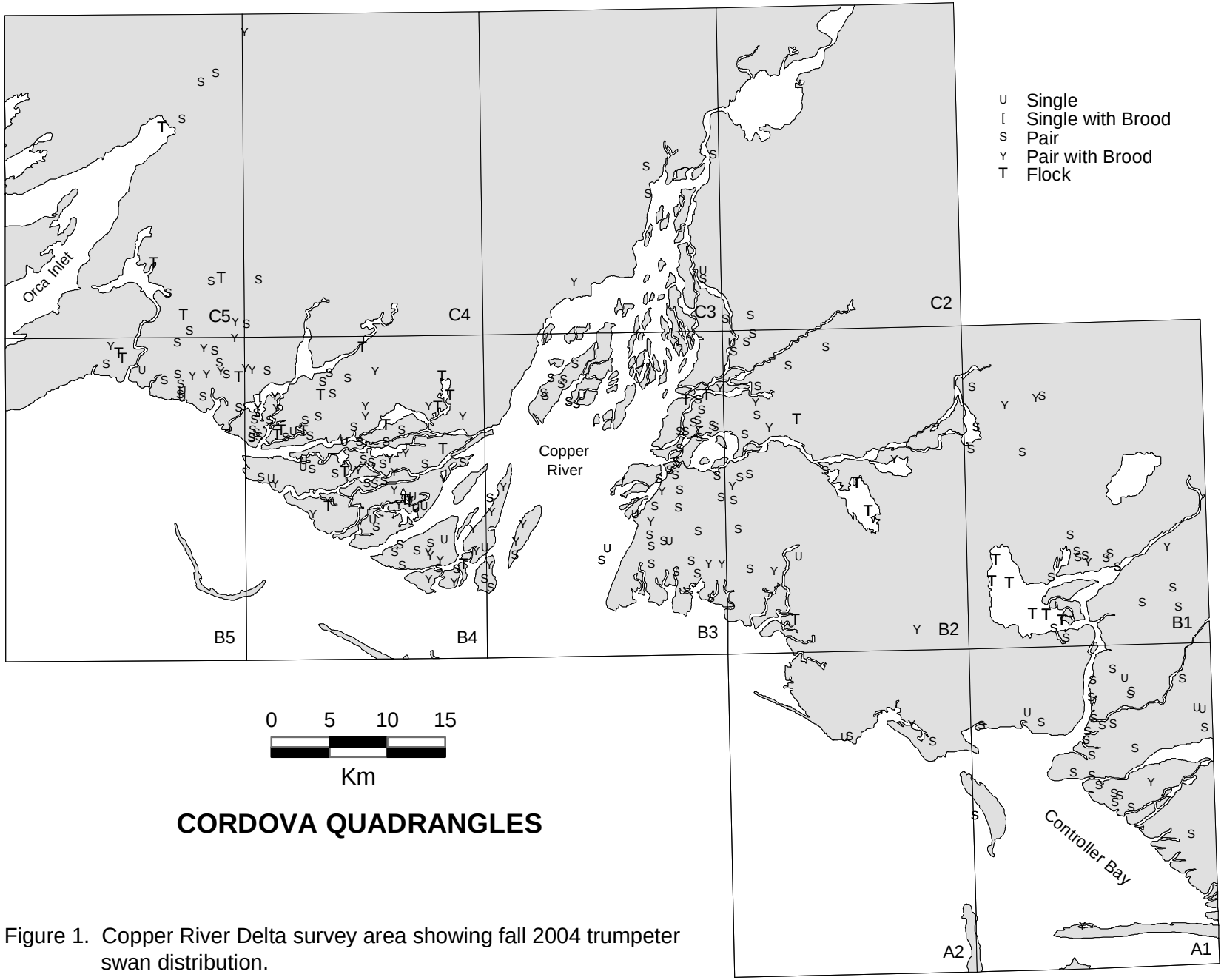

Figure 1. Copper River Delta survey area showing fall 2004 trumpeter swan distribution.

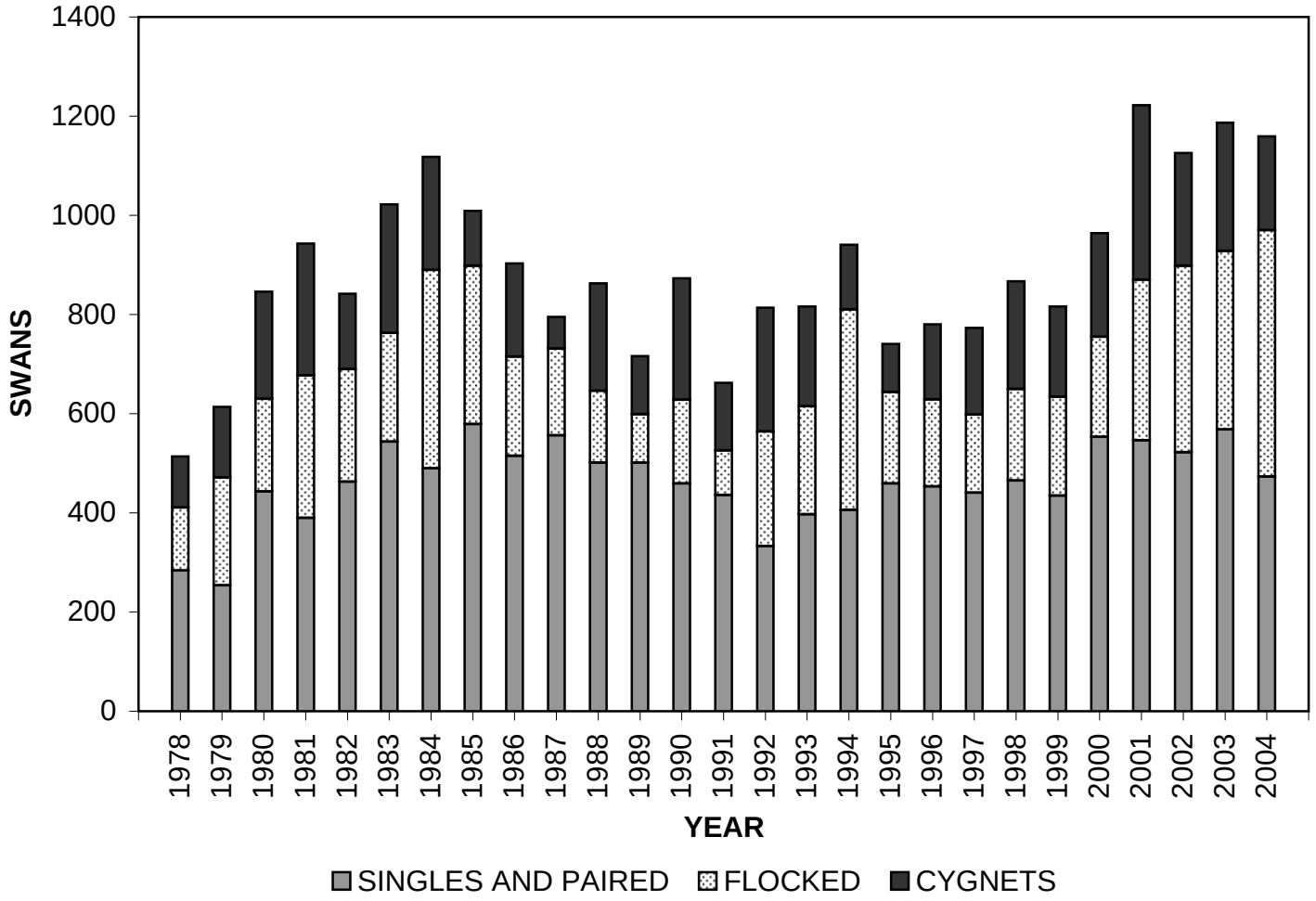

Figure 2. Population trend of trumpeter swans on the Copper River Delta survey area from fall surveys, 1978-2004.

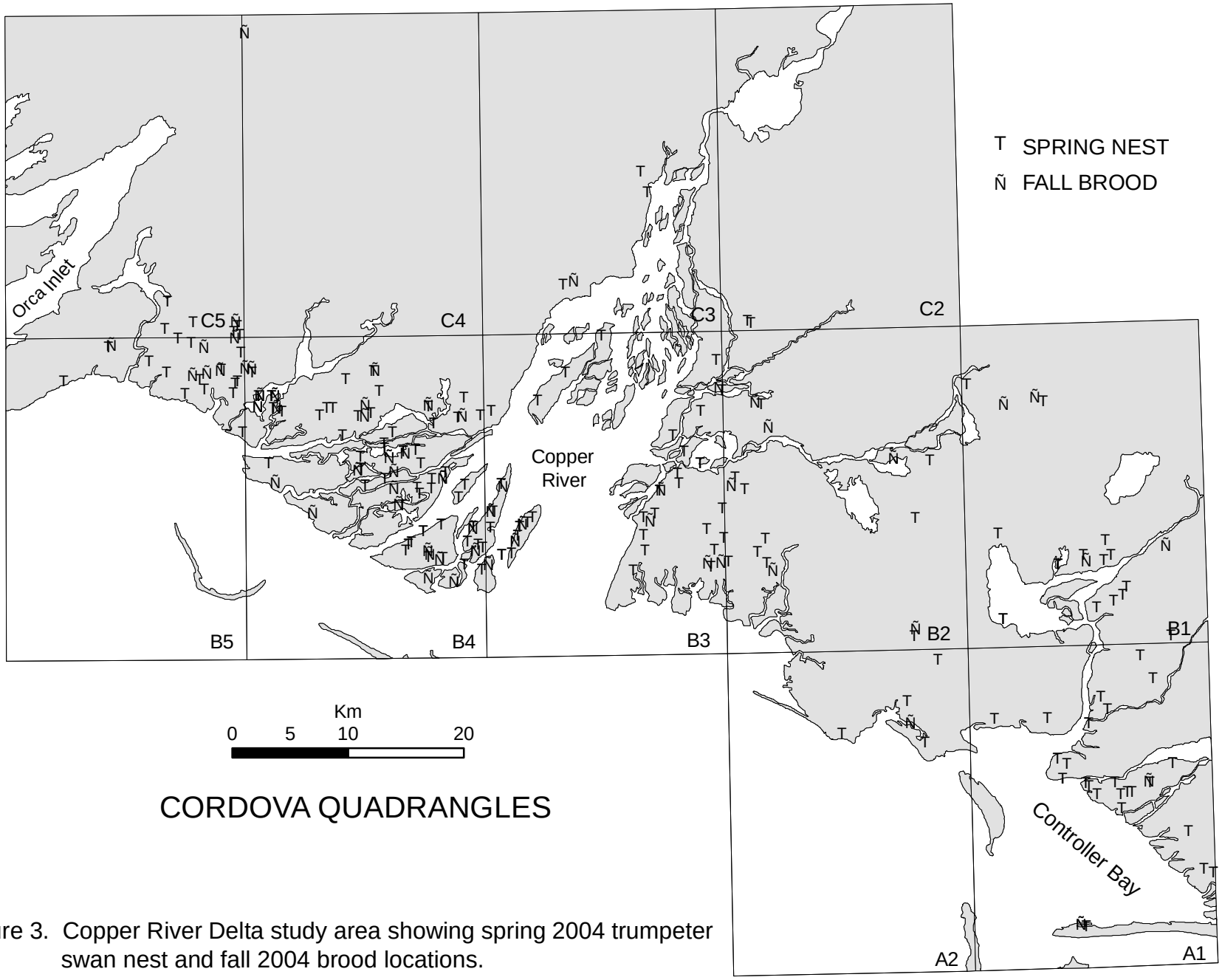

Figure 3. Copper River Delta study area showing spring 2004 trumpeter swan nest and fall 2004 brood locations.

Appendix. Results of 2004 spring and fall trumpeter swan surveys by 1:63,360 topographic map.

TRUMPETER SWAN SURVEYS
COPPER RIVER DELTA

SPRING 2004

MAP	QUAD	DATE	NO. OF OBS	AS SNG	IN PRS	IN FKS	NO. OF PRS	NO. OF FKS	PRS w/ NEST	SNG w/ NEST	PRS w/ BRD	SNG w/ BRD	0 w/ BRD	NO. OF NESTS	NO. OF BRDS	TOT ADU	TOT YNG	TOT SWANS
CORDOVA	A1	05/26/04	52	6	80	77	40	6	20	4	0	0	0	24	0	163	0	163
CORDOVA	A2	05/26/04	9	2	10	6	5	2	4	0	0	0	0	4	0	18	0	18
CORDOVA	B1	05/26/04	40	4	64	48	32	4	13	1	0	0	0	14	0	116	0	116
CORDOVA	B2	05/26/04	40	6	56	38	28	6	9	1	0	0	0	10	0	100	0	100
CORDOVA	B3	05/26/04	76	9	128	15	64	3	28	4	0	0	0	32	0	152	0	152
CORDOVA	B4	05/27/04	107	16	168	55	84	7	45	6	0	0	0	51	0	239	0	239
CORDOVA	B5	05/26/04	38	4	60	31	30	4	13	2	0	0	0	15	0	95	0	95
CORDOVA	C2	05/26/04	4	1	6	0	3	0	2	0	0	0	0	2	0	7	0	7
CORDOVA	C3	05/28/04	6	3	6	0	3	0	2	1	0	0	0	3	0	9	0	9
CORDOVA	C4	05/27/04	3	0	6	0	3	0	0	0	0	0	0	0	0	6	0	6
CORDOVA	C5	05/27/04	14	1	22	12	11	2	6	0	0	0	0	6	0	35	0	35
TOTAL			389	52	606	282	303	34	142	19	0	0	0	161	0	940	0	940

FALL 2004

MAP	QUAD	DATE	NO. OF OBS	AS SNG	IN PRS	IN FKS	NO. OF PRS	NO. OF FKS	PRS w/ NEST	SNG w/ NEST	PRS w/ BRD	SNG w/ BRD	0 w/ BRD	NO. OF NESTS	NO. OF BRDS	TOT ADU	TOT YNG	TOT SWANS
CORDOVA	A1	08/23/04	31	4	54	0	27	0	--	--	2	0	0	--	2	58	5	63
CORDOVA	A2	08/24/04	4	1	6	0	3	0	--	--	1	0	0	--	1	7	4	11
CORDOVA	B1	08/23/04	28	0	44	231	22	6	--	--	4	0	0	--	4	275	11	286
CORDOVA	B2	08/23/04	26	2	40	60	20	4	--	--	6	0	0	--	6	102	16	118
CORDOVA	B3	08/23/04	56	4	100	7	50	2	--	--	10	0	0	--	10	111	29	140
CORDOVA	B4	08/24/04	94	12	134	104	67	15	--	--	26	1	0	--	27	250	89	339
CORDOVA	B5	08/24/04	23	3	34	44	17	3	--	--	6	0	0	--	6	81	25	106
CORDOVA	C2	08/23/04	2	0	4	0	2	0	--	--	0	0	0	--	0	4	0	4
CORDOVA	C3	08/23/04	6	1	10	0	5	0	--	--	1	0	0	--	1	11	3	14
CORDOVA	C4	08/24/04	3	0	6	0	3	0	--	--	1	0	0	--	1	6	1	7
CORDOVA	C5	08/25/04	11	0	14	51	7	4	--	--	1	0	0	--	1	65	6	71
TOTAL			284	27	446	497	223	34	--	--	58	1	0	--	59	970	189	1159